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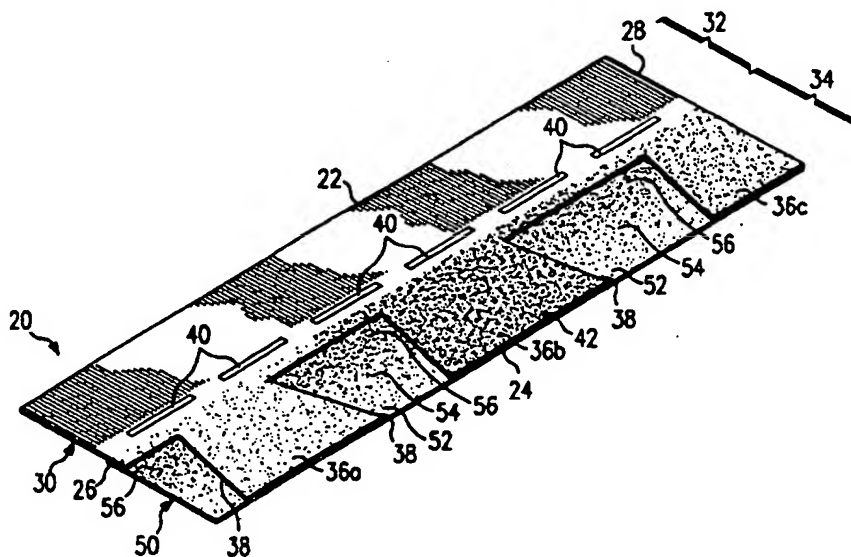
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : <b>E04D 1/28, B44F 7/00</b>	<b>A1</b>	(11) International Publication Number: <b>WO 96/17145</b> (43) International Publication Date: <b>6 June 1996 (06.06.96)</b>
(21) International Application Number: <b>PCT/US95/15657</b> (22) International Filing Date: <b>30 November 1995 (30.11.95)</b> (30) Priority Data: <b>08/347,032</b> <b>30 November 1994 (30.11.94)</b> <b>US</b> (71) Applicant: <b>ELK CORPORATION OF DALLAS [US/US];</b> Suite 1000, 14643 Dallas Parkway, Dallas, TX 75240-8871 (US). (72) Inventor: <b>WEAVER, Casimir, Paul; 4307 Fourth Avenue East,</b> Northport, AL 35476 (US). (74) Agent: <b>FELGER, Thomas, R.; Baker &amp; Botts, L.L.P., 2001</b> Ross Avenue, Dallas, TX 75201-2980 (US).		(81) Designated States: <b>AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).</b>  <b>Published</b> <i>With international search report.</i>

(54) Title: **LAMINATED ROOFING SHINGLE**



(57) Abstract

A shingle (20) is provided having a headlap section (32) and a buttlap section (34) with at least one portion of the buttlap section having a relatively uniform color and/or value and an adjacent portion of the buttlap section having a value gradation from light to dark. A plurality of horizontal striations (52, 54, 56) with transition stripes (152, 154) disposed between adjacent horizontal striations may be used to establish the desired value gradation. An illusion of depth or shingle thickness is created on the portion of the buttlap section having the value gradation. The buttlap section defines in part the exposed weather surface (42) of the associated shingle. The relatively uniform color and/or value portions may be formed on tabs or dragon teeth (36) and the value gradation formed on a backer sheet (50) disposed beneath the tabs. Openings (38) between tabs expose the enhanced value gradation to view.

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## LAMINATED ROOFING SHINGLE

TECHNICAL FIELD OF THE INVENTION

5 This invention relates to an improved roofing product, and in particular, to a shingle having an enhanced gradation of color values to create the illusion of thickness or depth on a relatively flat surface.

**BACKGROUND OF THE INVENTION**

Asphalt roofing products are often divided into three broad groups: shingles, roll roofing and underlayment. Shingles and roll roofing typically functions as outer roof coverings designed to withstand exposure to weather and the elements. Shingles and roll roofing generally contain the same basic components which provide protection and long term wear associated with asphalt roofing products. These components include a base material made from an organic felt or fiberglass mat which serves as a matrix to support the other components and gives the product the required strength to withstand manufacturing, handling, installation and service in the intended environment. An asphalt coating formulated for the particular service application is often applied to the base material to provide the desired long term ability to resist weathering and to provide stability under the anticipated temperature extremes. An outer layer of mineral granules is also commonly applied to the asphalt coating to form a surface exposed to the weather which shields the asphalt coating from the sun's rays, adds color to the final product and provides fire resistance.

Asphalt shingles are one of the most commonly used roofing materials. Such shingles are typically manufactured as strip shingles, interlocking shingles and large individual shingles in a variety of weights and colors. Such asphalt shingles are also often referred to as composite shingles. Even though composite and/or asphalt shingles offer significant cost, service life and flammability advantages over wood shingles, wood shingles are still often preferred due to the pleasing aesthetic appearance of a wood shingled roof. An important aesthetic advantage of such wood shingles is their greater thickness as compared to composite shingles. The

thickness of wood shingles results in a more pleasing, layered look for the finished roof.

Value is an indication of the relative darkness or lightness of a color. The human eye is capable of seeing a wide range of color values. As wood shingles age or weather, they produce an infinite variety of subtle changes in value which provide a pleasing aesthetic appearance. Also, changes in both lighting and naturally occurring shadows associated with relatively thick wood shingles further enhances their generally pleasing aesthetic appearance.

Various composite shingles have been developed to provide an appearance of thickness comparable to wood shingles. Examples of such composite or asphalt shingles are shown in United States Patent No. 5,232,530 entitled *Method of Making a Thick Shingle*; United States Patent No. 3,921,358 entitled *Composite Shingle*; United States Patent No. 4,717,614 entitled *Asphalt Shingle*; and design and United States Patent Des. 309,027 entitled *Tab Portion of a Shingle*. These above-referenced patents are incorporated by reference for all purposes within this application. Also, the *Residential Asphalt Roofing Manual* published by the Asphalt Roofing Manufacturers Association provides excellent information on various types of shingles and other roofing products.

SUMMARY OF THE INVENTION

In accordance with the present invention, a shingle is provided to substantially reduce or eliminate the shortcomings previously associated with the appearance of composite and/or asphalt shingles. In accordance with one aspect of the present invention, transition stripes may be disposed between horizontal striations to provide a value gradation with enhanced differences in contrast on portions of a shingle to create the illusion of thickness or depth on a relatively flat surface. The use of transition stripes prevents the enhanced difference in contrast from presenting a confused or disjointed appearance. The resulting shingle provides the appearance of depth or thickness often associated with wood shingles.

The present invention may be used with various roofing products including laminated shingles having tabs or dragon teeth extending from a first shingle sheet with the tabs disposed on top of a second shingle sheet. The first shingle sheet may sometimes be referred to as a dragon tooth strip and the second shingle sheet may sometimes be referred to as a "backer strip".

In accordance with another aspect of the present invention, a shingle may be provided having an exposed surface or weather surface with alternating first portions of relatively uniform value adjacent to second portions having an enhanced value gradation from light to dark. If desired, the relatively uniform value portions or first color portions may vary in contrast with respect to each other and the enhanced value gradation portions or the second color portions may also vary with respect to each other.

One embodiment of the present invention includes a laminated shingle having a plurality of dragon teeth with openings therebetween. A backer strip is preferably disposed under the dragon teeth with portions of the

backer strip exposed through the openings between the  
drag n teeth. Each dragon tooth preferably has a  
relatively uniform value and/or color. The color and  
value of adjacent dragon teeth may vary as desired. The  
5 exposed portions of the associated backer strip  
preferably have an enhanced value gradation from light to  
dark to create the desired illusion of depth. The  
present invention offers an increased range of values for  
any selected color using a manageable number of different  
10 horizontal striations and transitions stripes to produce  
the desired visual appearance.

Technical advantages of the present invention may  
include providing a laminated shingle with an enhanced  
value gradation formed by a plurality of horizontal  
15 striations on a backer strip with a large difference in  
contrast or value between the lightest striation and the  
darkest striation. The number and width of the  
horizontal striations formed on the backer strip may be  
varied to provide the enhanced gradation in value from  
20 light to dark to create the desired illusion of depth or  
thickness. A transition stripe may be formed between  
adjacent horizontal striations to further enhance the  
desired value gradation between horizontal striations  
having a large difference in contrast. By providing one  
25 or more transition stripes in accordance with the  
teachings of the present invention, horizontal striations  
having a high difference between light and dark values  
may be satisfactorily used to produce a pleasing subtle  
shading effect associated with wood shingles while at the  
30 same time allowing the use of the enhanced value  
gradation associated with high contrasts. For some  
applications the large difference in contrast between the  
lightest striation and the darkest striation would  
produce a confused and disjointed appearance instead of  
35 providing the desired appearance without the use of  
transition stripes disposed between adjacent horizontal

striations in accordance with the teachings of the present invention.



**BRIEF DESCRIPTION OF THE DRAWINGS**

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a perspective view of a single laminated shingle incorporating one embodiment of the present invention;

FIGURE 2 is a top plan view of the shingle of FIGURE 1;

FIGURE 3 is a front view of the shingle of FIGURE 1;

FIGURE 4 is a left side view of the shingle of FIGURE 1;

FIGURE 5 is a perspective view of a partial roofing section covered with shingles incorporating one embodiment of the present invention;

FIGURE 6A is a schematic drawing with portions broken away of a sheet of roofing material incorporating one embodiment of the present invention from which components for the shingle of FIGURE 1 may be obtained;

FIGURE 6B is an enlarged drawing with portions broken away showing the sheet of roofing material in FIGURE 6A with transition stripes disposed between adjacent horizontal striations;

FIGURE 6C is a schematic drawing with portions broken away showing one alternative embodiment to allow for recovery of loose mineral granules from the surface of the sheet of roofing material;

FIGURE 7A is an exploded isometric view showing components taken from the sheet of roofing material in FIGURE 6A which may be used to form the shingle of FIGURE 1;

FIGURE 7B is an enlarged drawing with portions broken away showing a second shingle sheet or backer strip of FIGURE 7A with transition stripes disposed between adjacent horizontal striations; and

FIGURE 8 is an isometric drawing showing portions of a hopper which may be used to form transition stripes between adjacent horizontal striations in accordance with one embodiment of the present invention.

### DETAILED DESCRIPTION OF THE INVENTION

The preferred embodiments of the present invention and its advantages are best understood by referring to FIGURES 1-8 of the drawings, like numerals being used for like and corresponding parts of the various drawings.

Laminated shingle 20 incorporating one embodiment of the present invention is shown in FIGURES 1-4. Laminated shingle 20 preferably comprises first shingle sheet 30 and second shingle sheet 50, which cooperate with each other to provide headlap section 32 and buttlap section 34. First shingle sheet 30 has a generally rectangular configuration comprising headlap section 32 with a plurality of tabs 36 extending therefrom to partially define buttlap section 34. For purposes of explanation, tabs 36 are further designated respectively as 36a, 36b and 36c. Tabs 36 may also be referred to as "dragon teeth". A plurality of openings 38 may be formed between adjacent tabs 36. Second shingle sheet 50 also has a generally rectangular configuration and may be disposed beneath tabs 36 with portions of second shingle sheet 50 exposed through the associated openings 38.

Various techniques such as a self-sealing adhesive strip (not shown) may be used to attach second shingle sheet 50 to the underside of first shingle sheet 30. The resulting laminated shingle 20 has a generally rectangular configuration defined in part by longitudinal edges 22 and 24 with lateral edges 26 and 28. Longitudinal edge 22 defines in part the upper edge of the resulting laminated shingle 20. Longitudinal edge 24 defines in part the lower edge or leading edge of laminated shingle 20. A plurality of self sealing adhesive strips 40 are preferably disposed on the exterior of first shingle sheet 30 between headlap section 32 and buttlap section 34.

First shingle sheet 30 may sometimes be referred to as a "dragon tooth sheet". Second shingle sheet 50 may

sometimes be referred to as a "backer strip". Also, openings 38 formed between adjacent tabs 36 with portions of backer strip 50 disposed thereunder may sometimes be referred to as "valleys." Depending upon the desired application and appearance of each shingle 20, tabs 36 may have equal or different widths and may have a square, rectangular, trapezoidal, or any other desired geometric configuration. In the same respect, openings 38 may have equal or different widths and may have a square, rectangular, trapezoidal or any other desired geometric configuration. As will be explained later in more detail, laminated shingles 20 may be fabricated from sheet 80 of roofing material shown in FIGURE 6A with tabs 36 and openings 38 formed as a "reverse image" of each other.

For one embodiment of the present invention, laminated shingle 20 may be formed from a fiberglass mat (not shown) with an asphalt coating on both sides of the mat. If desired, the present invention may also be used with shingles formed from organic felt or other types of suitable base material. The present invention is not limited to use with shingles having a fiberglass mat.

The exposed outer surface or weather surface 42 for shingle 20 is defined in part by tabs 36 and the portions of backer strip 50 which are exposed through openings 38 between adjacent tabs 36. Weather surface 42 of laminated shingle 20 may be coated with various types of mineral granules to protect the associated asphalt coating, to add color to laminated shingle 20 and to provide fire resistance. For some applications, ceramic coated mineral granules may be used to form the outer layer comprising weather surface 42. Also, a wide range of mineral colors from white and black to various shades of red, green, yellow, brown, blue and any combination thereof may be used to provide the desired color or colors for shingle 20. The underside of shingle 20 may

be coated with various inert minerals with sufficient consistency to seal the associated asphalt coating.

5 An important feature of the present invention includes providing a plurality of horizontal striations on the surface of second shingle sheet 50 which is exposed through respective openings 38. For the embodiment of the present invention shown in FIGURES 1 through 4, second shingle sheet 50 has three horizontal striations 52, 54 and 56. These horizontal striations 10 52, 54 and 56 preferably provide a value gradation from light starting at leading edge 24 to dark at the upper portion of each opening 38.

The number of horizontal striations and the width of each striation on backer strip 50 may be varied depending upon the desired aesthetic appearance of the resulting 15 laminated shingle 20. For some applications, the value gradation formed on second shingle sheet 50 may include ten or fifteen striations with each striation having a width of one quarter of an inch to one half an inch. Also, each striation may have a different color and/or 20 value to establish the desired amount of contrast. Contrast for purposes of this patent application is defined as the degree of difference in the value between areas of light and dark.

25 For some applications, a gradual change in contrast associated with a large number of striations may provide the appearance of depth or thickness associated with wood or other natural products. Also, the amount or degree of contrast in the value gradation exposed in each opening 38 may be varied depending upon the desired aesthetic 30 appearance. An important feature of the present invention is the ability to vary the value gradation and the amount of contrast to provide the desired illusion or appearance of thickness on the finished roof.

35 As shown in FIGURES 1 and 2, second shingle sheet 50 preferably includes transition stripe 152 disposed

between horizontal striations 52 and 54 and transition stripe 154 disposed between horizontal striations 54 and 56. The relationship between horizontal striations 52, 54 and 56 and the associate transition stripes 152 and 154 are more fully shown in FIGURE 6B and 7B.

For some applications, an enhanced appearance of depth may be created on laminated shingle 20 by forming horizontal striation 52 from a relatively light value and horizontal striation 56 from a relatively dark value with a large difference in contrast between the light value and the dark value. The difference in colorimeter readings between the lightest value and the darkest value or the contrast between horizontal striations 52 and 56 may vary from approximately nine (9) to eighteen (18) depending on the selected generic color and its associated tone. Transition stripe 152 may be formed from a relatively uniform mixture of approximately fifty percent (50%) ceramic coated mineral granules associated with horizontal striation 52 and approximately fifty percent (50%) ceramic coated mineral granules associated with horizontal striation 54. In the same respect, transition stripe 154 may be formed from a relatively uniform mixture of the respective ceramic coated mineral granules used to form horizontal striations 54 and 56.

For other applications the ratio of ceramic coated mineral granules from adjacent horizontal striations may be varied from twenty-five percent (25%) to seventy-five (75%). The present invention allows the specific ratio of mineral granules used to form each transition stripe to be varied depending upon the specific color and value of the adjacent horizontal striations. Thus, the present invention allows the use of transition stripes 152 and 154 to provide a subtle gradation or change in value between the respective horizontal striations 52, 54 and 56.

For some applications, each horizontal striation 52, 54 and 56 along with the associated transition stripes 152 and 154, may be formed from mineral granules having the same generic color or tone, such as brown, gray, red, blue, yellow or black. Horizontal striations 52, 54 and 56 are preferably formed from the selected generic color having respective variations of the generic color with a light, medium and dark value. A colorimeter or other suitable testing equipment may be used to measure the value of light or dark contrast associated with horizontal striations 52 and 56 to evaluate the desired difference in value or contrast between the respective striations.

Generally, the greater the difference in contrast the more aesthetically appealing the resulting shingle. However, for some applications, a large difference in contrast or value between horizontal striations 52, 54 and 56 without an appropriate gradation in value between these striations will create a confused and disjointed appearance. The unpleasant appearance may be a striped or "zebra" effect. Therefore, an important feature of the present invention includes providing transition stripes 152 and 154 between the associated horizontal striations 52, 54 and 56. As will be explained later in more detail with respect to FIGURE 8, transition stripe 152 may be formed from a relatively uniform mixture of ceramic coated minerals associated with horizontal striation 52 and ceramic coated minerals associated with horizontal striation 54. In a similar manner the ceramic coated minerals used to form transition stripe 154 may be a mixture of ceramic coated mineral granules associated with horizontal striation 54 and ceramic coated mineral granules associated with horizontal striation 56.

The acceptable difference in contrast between horizontal striations 52 and 56 depends in part upon the generic color and tone selected for the specific

laminated shingle 20. For example, the preferred contrast in value for some color tones may be as high as eighteen (18) while for other color tones, the contrast value may be eight (8) or nine (9).

5           An important feature of the present invention includes the ability to vary the mixture of the ceramic coated mineral granules used to form transition stripes 152 and 154 to provide the desired subtle, gradual change in value between horizontal striations 52 and 56, while  
10       at the same time having a large value gradation. For a typical group of color tones, such as brown, gray, red, blue, yellow and black, an acceptable range of color contrast or value gradation may be from six (6) to eleven (11). By including transition stripes 152 and 154  
15       between horizontal striations 52, 54 and 56, the acceptable range for the value gradation for the same family of colors may be increased from nine (9) to eighteen (18). Thus, the use of transition stripes in accordance with the teachings of the present inventions  
20       allows use of a higher value gradation for the same color tone as compared with previous techniques.

          For purposes of illustration, tab 36a is shown having a relatively light value corresponding with horizontal striation 52. Tab 36b is shown having a  
25       relatively dark value corresponding with horizontal striation 56. Tab 36c is shown having a medium value corresponding with the value of horizontal striation 54. For other applications, each tab 36 may have essentially the same uniform value and/or color. Alternatively, tabs  
30       36a and 36c may have the same value and/or color and tab 36b a different value and/or color. The present invention allows shingle 20 to have a weather surface 42 with enhanced value gradations represented by horizontal striations 52, 54 and 56 and their associated transition  
35       stripes 152 and 154 disposed between relatively uniform value portions represented by tabs 36a, 36b and 36c.



As best shown in FIGURE 5, a plurality of laminated shingles 20 may be installed on a roof or other structure (not shown) to provide protection from the environment and to provide an aesthetically pleasing appearance. The normal installation procedure for laminated shingles 20 includes placing each shingle 20 on a roof with an overlapping configuration. Typically, buttlap section 34 of one shingle 20 will be disposed on the headlap section 32 of another shingle 20. Self-sealing adhesive strips 40 may be used to secure the overlapping shingles 20 with each other. Also, a limited lateral offset is preferably provided between horizontally adjacent rows of shingle 20 to provide an overall aesthetically pleasing appearance for the resulting roof.

FIGURES 6A and 7A illustrate portions of the procedures associated with fabricating laminated shingle 20 from sheet 80 of roofing material incorporating one embodiment of the present invention. Various procedures and methods may be used to manufacture sheet 80 of roofing material from which shingles incorporating the present invention may be fabricated. Examples of such procedures are contained in United States Patent Nos. 1,722,702 entitled *Roofing Shingle*; 3,624,975 entitled *Strip Shingle of Improved Aesthetic Character*; 4,399,186 entitled *Foam Asphalt Weathering Sheet for Rural Roofing Siding or Shingles*; and 4,405,680 entitled *Roofing Shingle*. Each of these preceding patents is incorporated by reference for all purposes within this application.

Sheet 80 is preferably formed from a fiberglass mat placed on a jumbo roll (not shown) having a width corresponding to the desired sheet 80. Laminated shingles 20 are typically fabricated in a continuous process starting with the jumbo roll of fiberglass mat. As previously noted, laminated shingles 20 may also be fabricated using organic felt or other types of base material.

Sheet 80, as shown in FIGURE 6A, preferably comprises a fiberglass mat with an asphalt coating which will both coat the fibers and fill any void spaces between the fibers. A powdered limestone stabilizer (not shown) may be included as part of the asphalt coating process. A smooth surface of various inert minerals of sufficient consistency may be placed on the bottom surface of sheet 80 to seal the asphalt coating. Top surface 82 is preferably covered with a layer of mineral granules such as ceramic coated stone granules to provide the desired relatively uniform color and/or value portions and the value gradation portions associated with weather surface 42 of shingle 20.

FIGURE 6A shows a schematic representation of roller 86 and mineral granular hopper 90 which may be used to provide the desired granular surface coating for sheet 80. Arrow 100 shows the direction of travel for sheet 80. Hopper 90 includes a plurality of partitions 91 which divide hopper 90 into compartments 92, 94, 96 and 98. The larger compartment or central compartment 98 of hopper 90 may contain the mineral granules which will produce the desired color on dragon teeth or tabs 36 and the other portions of first shingle sheet 30 which will be exposed to the environment. The transfer of mineral granules from hopper 90 may sometimes be referred to as a "color drop."

The present invention may be used with various types of granule storage, color mixers and granule blenders to provide various color drops on tabs 36 and/or headlap portion 32 as desired for the specific laminated shingle 20. Also, various types of rollers and/or granule blenders may be used to place mineral granules with the desired variations in value and/or color on top surface 82 of sheet 80. The present invention is not limited to use with hopper 90 and roller 86 as shown in FIGURE 6A. For one application, multiple rollers may be used to form

top surface 82. Also, various types of granule recovery equipment (not shown) may be provided to collect any loose granules on top surface 82 and return them to hopper 90. FIGURE 6C shows a schematic arrangement for one orientation of sheet 80 relative to roller 86 and hopper 80 to assist with the recovery of loose granules. Various other arrangements may be used as known in the art.

As previously noted transition stripe 152 is preferably disposed between horizontal striations 52 and 54 and transition stripe 154 is preferably disposed between horizontal striations 54 and 56. For purposes of illustration, only horizontal striations 52, 54 and 56 are shown in FIGURE 6A with solid lines 53 and 55 disposed respectively therebetween. Solid lines 53 and 55 are typically not present on the actual backer strips 50. For one application, the nominal width of horizontal striations 52, 54 and 56, as shown in FIGURE 6B, may be in the range of approximately 1.4 to 0.9 inches.

Transitions stripes 152 and 154, as best shown in FIGURE 6B, are preferably disposed between respective horizontal striations 52, 54 and 56. For one application of the present invention, transition stripes 152 and 154 preferably have a width of approximately one inch. The centerline of transition stripe 152 will preferably correspond approximately with line 53 between horizontal striations 52 and 54. The centerline of transition stripe 154 will preferably correspond approximately with line 55 between horizontal striations 54 and 56. For purposes of illustration, only solid lines 151 and 153 are shown in FIGURE 6B to more clearly identify transition stripe 152. In the same respect, solid lines 155 and 157 are shown in FIGURE 6B to more clearly define transition stripe 154. In actual practice, solid lines 151, 153, 155 and 157 are typically not formed on the respective backer strip 50.

For the embodiment of the present invention shown in FIGURES 6A and 7A, each first shingle sheet 30 may have the same mixture of mineral granules on both the headlap section and the buttlap section. For the embodiment shown in FIGURES 1 through 4, headlap section 32 may have the same layer of mineral granules as buttlap section 34 or headlap section 32 may have a neutral or noncolored layer of mineral granules. As previously noted, an important feature of the present invention includes providing at least one portion of weather surface 42 having a relatively uniform value and/or color and another portion of weather surface 42 having an enhanced value gradation from light to dark to create the appearance of depth or thickness on the associated portion of weather surface 42. The surface layer on headlap section 32 may be varied as desired for each application.

Different colored mineral granules corresponding to the desired horizontal striations 52, 54 and 56 may be placed in the appropriate compartments 92, 94 and 96 for one embodiment of the present invention. As sheet 80 passes under hopper 90, mineral granules from the appropriate compartment in hopper 90 will fall onto top surface 82 of sheet 80. Roller 85 will then press the mineral granules into the associated asphalt coating. The volume or pounds per square foot of mineral granules placed on surface 82 is preferably the same throughout the full width of sheet 80. However, by dividing hopper bin 90 into compartments, the color and/or value of various portions of sheet 80 may be varied including providing horizontal striations 52, 54, and 56 and transition stripes 152 and 154 for backer strip 50.

It is important to note that conventional procedures for fabricating shingles having an exterior surface formed by mineral granules include the use of granule blenders and c l r mixers, along with sophisticated

equipment to ensure a constant uniform color at each location on the exposed portions of the shingles. Extensive procedures are used to ensure that each color drop on a sheet of roofing material is uniform. The color drop between shingles may be varied to provide different shades or tones in color. However, within each color drop, concerted efforts have traditionally been made to insure uniformity of the color on the resulting shingle associated with each color drop.

As shown by dotted lines 84, 186, and 88 in FIGURE 6A, sheet 80 may be cut into four horizontal lengths or lanes 60, 62, 64, and 66. The width of lanes 62 and 64 is selected to correspond generally with the desired width for first shingle sheet 30. The width of lanes 60 and 66 is selected to correspond generally with the desired width for second shingle sheet 50. Lanes 60, 62, 64, and 66 may then be cut laterally to correspond with the desired length for the resulting first shingle sheet 30 and second shingle sheet 50. The rotation of roller 86 and the movement of sheet 80 are coordinated to place the desired color drop or drops on each shingle 20.

The cut along dotted line 186 corresponds with the desired pattern for dragon teeth 36 and associated openings 38. For some applications, eight lanes may be cut from a sheet of roofing material similar to sheet 80. The number of lanes is dependent upon the width of the respective sheet of roofing material and the desired width of the resulting shingles.

As shown in FIGURE 7A, each lateral cut of sheet 80 will typically result in two backer strips 50 and two first shingle sheets 30 which may be assembled with each other to form two laminated shingles 20. The resulting laminated shingles 20 are then packaged with the desired color configuration for future installation on a roof.

FIGURE 8 shows a portion of hopper 90 represented by splitter 93 which may be satisfactorily used to place

mineral granules on sheet 80 to form horizontal striations 52, 54 and 56 along with the associated transition stripes 152 and 154. The upper portion or the inlet portion of compartments 92 and 96 contain one or more recesses 102 which are provided to adjust the flow rate of mineral granules in the respective compartment 92 and 96 to correspond approximately with the mineral granule flow rate in compartment 94. Outlet end 104 of splitter 93 has been modified in accordance with the teachings of the present invention to provide the desired mixture of color granules associated with each transition stripe 152 and 154.

For the specific example shown in FIGURE 8, partition 91 between compartments 92 and 94 includes a pair of diverters with respective openings 106 and 108. An important feature of the present invention includes the ability to adjust the geometric configuration and the dimensions associated with diverters and openings 106 and 108 to vary the percentage of mineral granules from the respective compartments 92 and 94 which will form transition stripe 152. In a similar manner, partition 91 between compartments 94 and 96 includes a pair of diverters and respective openings 110 and 112 to regulate the percentage of mineral granules from the respective compartments 94 and 96 which form transition stripe 154. As previously noted for one application, transition stripes 152 and 154 preferably include approximately an equal mixture of mineral granules from the respective compartments 92, 94 and 96. However, the geometric configuration and dimensions of the diverters and their respective openings 106, 108, 110 and 112 may be varied to adjust the ratio of mineral granules from the respective compartments 92, 94 and 96 which form transition stripes 152 and 154. Also, various mechanisms other than splitter 93 may be satisfactorily used to form transition stripes 152 and 154.

It is important to note that an enhanced value gradation of the present invention may be placed on shingles using various procedures and various types of materials. The present invention is not limited to shingles formed by the process shown in FIGURES 6A and 7A.

Although the present invention and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. A shingle having an exposed weather surface comprising:

5       at least one portion of the weather surface having a relatively uniform color;

          an adjacent portion of the weather surface having a color-value gradation from light to dark formed in part by a plurality of horizontal striations with each  
10       striation having a different color-value as compared to an adjacent striation to create the appearance of depth on the weather surface;

          a transition stripe disposed between adjacent striations to form a portion of the color-value gradation  
15       and each transition stripe having a color-value comprising a mixture of the respective colors associated with the horizontal striations disposed on either side of each transition stripe whereby the color-value gradation has an enhanced difference between light to dark color-  
20       values and at the same time provides a gradual change in color-value between the respective horizontal striations; and

          the color-value gradation comprises the plurality of horizontal striations and the associated transition  
25       stripes each having a selected contrast to establish the desired gradation in color-value.

2. The shingle of Claim 1 wherein the color-value gradation comprises three horizontal striations.

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3. The shingle of Claim 1 wherein the color-value gradation comprises each horizontal striation having a width selected from the range consisting of approximately 0.9 to 1.4 inches and the transition stripes disposed  
35       between adjacent horizontal striations having a width of approximately one inch.



4. Th shingle of Claim 1 further comprising:  
a laminated roofing shingle having a first shingle  
sheet with a plurality of tabs extending therefrom and  
openings disposed between the tabs;

5 a second shingle sheet disposed under the tabs and a  
portion of the second shingle sheet exposed in each of  
the openings between the tabs;

10 the weather surface formed in part by the tabs and  
the portions of the second shingle sheet which are  
exposed by the openings between adjacent tabs;

the relatively uniform color portion disposed on the  
tabs; and

the color-value gradation disposed on the second  
shingle sheet between the tabs.

15

5. The shingle of Claim 4 wherein the second  
shingle sheet further comprises three horizontal  
striations with each striation having a different  
contrast to establish the desired gradation in color-  
20 value from light to dark.

6. The shingle of Claim 1 further comprising:  
a laminated roofing shingle having a first shingle  
sheet with a plurality of tabs extending therefrom and  
5 openings disposed between the tabs;  
a second shingle sheet disposed under the tabs and a  
portion of the second shingle sheet exposed in each of  
the openings between the tabs;  
the weather surface formed in part by the tabs and  
10 the portions of the second shingle sheet which are  
exposed by the openings between adjacent tabs;  
each tab having a layer of mineral granules to  
provide the relatively uniform color portion associated  
with each tab;  
15 a layer of mineral granules forming the color-value  
gradation on the second shingle sheet between the tabs;  
each horizontal striation formed by mineral granules  
having a different color-value as compared to adjacent  
horizontal striations; and  
20 each transition stripe formed by an approximately  
equal mixture of the mineral granules used to form the  
horizontal striations on opposite sides of the respective  
transition stripe.

7. The shingle of Claim 1 further comprising:
- a first sheet having a generally rectangular configuration with a plurality of tabs extending therefrom and openings disposed between the tabs;
  - a second sheet having a generally rectangular configuration disposed under the tabs and a portion of the second shingle sheet exposed in each of the openings between the tabs;
  - the weather surface formed in part by the tabs and the portions of the second shingle sheet which are exposed by the openings between adjacent tabs;
  - each tab having a respective generally uniform color; and
  - the color-value gradation disposed on the second shingle sheet between the tabs with a lighter color-value at the lower edge of the second shingle sheet and a darker color-value adjacent to the upper portion of each opening.

8. A laminated shingle having a first shingle sheet with a plurality of tabs and a second shingle sheet comprising:

5 each of the tabs having a relatively uniform color portion;

an opening formed between adjacent tabs;

the second shingle sheet disposed beneath the tabs with a portion of the second shingle sheet exposed through the respective openings;

10 a color-value gradation from light to dark formed on the exposed portion of the second shingle sheet by a plurality of horizontal striations with each striation having granules with a different color-value as compared to an adjacent striation to create an appearance of depth  
15 in cooperation with the tabs forming the respective openings;

a transition stripe disposed between adjacent striations and each transition stripe having a color-value comprising a mixture of the respective granules of  
20 the horizontal striations disposed on either side of each transition stripe whereby the color-value gradation has an enhanced difference between light to dark color-values while at the same time providing a gradual change in color-value between the respective horizontal striations;  
25 and

the mixture of granules for each transition stripe varying from 25% to 75% of the respective granules of the horizontal striation disposed on either side of the respective transition stripe.

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9. The laminated shingle of Claim 8 further comprising each transition stripe on the second shingle sheet having an approximately equal mixture of the  
5 respective granules of the horizontal striation disposed on either side of each transition stripe to establish the color-value gradation on the second shingle sheet.

10. The laminated shingle of Claim 8 wherein the  
10 horizontal striations further comprise one striation having a lighter color-value and an adjacent striation having a darker color-value to establish the color-value gradation.

11. The laminated shingle of Claim 8 further  
15 comprising three horizontal striations formed on the second shingle sheet to establish the color-value gradation from light to dark.

12. The laminated shingle of Claim 8 further  
20 comprising:  
a weather surface defined in part by the tabs and the portions of the second shingle sheet exposed through the associated opening between adjacent tabs;  
25 the weather surface having a layer of mineral granules disposed thereon;  
the mineral granule layer on each tab having a relatively uniform color-value; and  
the plurality of horizontal striations on the second  
30 sheet forming the color-value gradation from light to dark.

13. The laminated shingle of Claim 8 further  
35 comprising a variation in color between adjacent tabs.

14. The laminated shingle of Claim 8 further comprising a variation in the color-value gradation between portions of the second shingle sheet exposed through the respective openings.

15. A laminated roofing shingle for enhancing the appearance of depth of the shingle comprising:

a first shingle sheet having a plurality of tabs extending from an edge thereof, the tabs spaced apart to define a plurality of openings between the tabs;

the color of the tabs being relatively uniform throughout each tab;

a second shingle sheet disposed beneath and attached to the underside of the first shingle sheet to form a two-ply laminated shingle, with portions of the second shingle sheet being exposed through the openings between the tabs;

a plurality of horizontal striations forming a color-value gradation across the portions of the second shingle sheet which are exposed through the openings between the tabs;

a transition stripe disposed between adjacent striations and each transition stripe having a color comprising a mixture of the respective colors associated with the horizontal striations disposed on either side of each transition stripe whereby the color-value gradation has an enhanced difference between light to dark color-values and at the same time providing a gradual change in color-value between the respective horizontal striations;

the mixture of granules for each transition stripe varying from 25% to 75% of the respective granules of the horizontal striation disposed on either side of the respective transition stripe;

each of the striations having an elongated generally rectangular area disposed within the portions of the second sheet, each of the striations having a color substantially uniform throughout its respective generally rectangular area with each of the rectangular areas being approximately equal in size;

one of the striations occupying the top of the portions of the second shingle sheet and another of the

striations occupying the bottom of the portions of the second shingle sheet with the striations occupying the bottom of the portions of the second sheet having a lighter color-value than the color-value of the striations occupying the top of the portions of the second shingle sheet; and

the plurality of horizontal striations and associated transition stripes providing the color-value gradation over each of the portions of the second shingle sheet which are exposed through the openings between the tabs, such that an appearance of shingle depth is created by the combined visual appearance of the color-value contrasts and gradations provided by the first and second shingle sheets.

16. The laminated roofing shingle of Claim 15 wherein the plurality of horizontal striations further comprise at least two horizontal striations of differing colors forming the color-value gradation.

17. The laminated roofing shingle of Claim 15 wherein the plurality of horizontal striations further comprise:

a first striation occupying approximately the top one third of each of the portions of the second shingle sheet;

a second striation occupying approximately the middle one third of each of the portions of the second shingle sheet; and

a third striation occupying approximately the bottom one third of each of the portions of the second shingle sheet.

18. The laminated roofing shingle of Claim 15 wherein different tabs have different contrasts from one another.



19. The laminated roofing shingle of Claim 15 wherein the dimensions of one of the tabs and the openings formed thereby differ from the dimensions of others of the tabs and the openings formed thereby.

20. A laminated roofing shingle for enhancing the appearance of depth of the shingle comprising:

5 a first shingle sheet having a plurality of tabs extending from an edge thereof, the tabs spaced apart to define a plurality of openings between the tabs;

the color of the tabs being relatively uniform throughout each tab;

10 a second shingle sheet disposed beneath and attached to the underside of the first shingle sheet to form a two-ply laminated shingle, with portions of the second shingle sheet being exposed through the openings between the tabs;

15 first, second and third horizontal striations forming a color-value gradation across the portions of the second sheet which are exposed through the openings between the tabs;

20 the first striations having an elongated, generally rectangular area and occupying the top of the portions of the second sheet, the first striations having a color-value substantially uniform throughout the generally rectangular area;

25 the second striations having an elongated generally rectangular area approximately equal to the area of the first striations, the second striations occupying the middle of the portions of the second sheets, the second striations having a color-value lighter than the color of the first striations and the lighter color-value being substantially uniform throughout the generally rectangular area;

30 the third striations having an elongated generally rectangular area occupying the bottom of the portions of the second sheet, the third striations having a lighter color-value than the color-value of the second striations and the lighter color-value being substantially uniform throughout the generally rectangular area;

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first transition strip s disposed between the first striations and th second striations with each of the first transition stripes having a color-value comprising a mixture of the respective color-values of the first striations and the second striations whereby the color-value gradation has an enhanced difference between the light to dark color-value and at the same time provides a gradual change in color-value between the first striations and the second striations;

second transition stripes disposed between the second striations and the third striations with each of the second transition stripes having a color-value comprising a mixture of the respective color-values of the second striations and the third striations whereby the color-value gradation has an enhanced difference between the light and dark value and at the same time provides a gradual change in color-value between the second striations and the third striations; and

the first, second and third horizontal striations and associated transition stripes providing the color-value gradation over each of the portions of the second shingle sheet which are exposed through the openings between the tabs, such that an appearance of shingle depth is created by the combined visual appearance of the color-value gradations provided by the first and second shingle sheets and the adjacent tabs.

21. The laminated roofing shingle of Claim 20 wherein different tabs have different values of color from one another.

22. The laminated roofing shingle of Claim 20 wherein the dimensions of one of the tabs and the openings formed thereby differ from the dimensions of others of the tabs and the openings formed thereby.

23. The laminated shingle of Claim 20 and further comprising at least two horizontal striations formed on the second shingle sheet to establish the desired color-value gradation from light to dark.

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24. The laminated shingle of Claim 20 and further comprising three horizontal striations formed on the second shingle sheet to establish the desired color-value gradation from light to dark.

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25. The laminated shingle of Claim 20 and further comprising a variation in color-value between adjacent tabs.

26. A method of fabricating a two-ply laminat d roofing shingle with an enhanced appearance of depth on exposed portions of the shingle comprising the steps of:

5       forming a first shingle sheet having a plurality of tabs extending from one edge thereof;

          spacing the tabs from each other to define a plurality of openings between the tabs;

10       forming a respective relatively uniform color portion on each of the tabs;

          forming the laminated shingle by disposing a second shingle sheet beneath and attached to the underside of the first shingle sheet with portions of the second shingle sheet exposed through the openings formed by the tabs;

15       placing colored granules on the second shingle sheet to form a plurality of horizontal striations on the second shingle sheet to provide a color-value gradation across the portions of the second shingle sheet which are exposed through the openings;

20       placing a transition stripe between adjacent horizontal striations with each transition stripe having a color-value comprising a mixture of the respective granules associated with the horizontal striations disposed on either side of the respective transition stripe whereby the color-value gradation has an enhanced difference from light to dark color-values and at the same time provides a gradual change in color-value between the respective horizontal striations;

25       forming each of the respective horizontal striations with a substantially uniform color-value;

30       placing one of the horizontal striations having a dark color-value near the top of the portions of the second shingle sheet and placing another of the horizontal striations near the bottom of the portions of the second shingl sh et with the striation occupying the

35

bottom of the portions having a lighter color-value than the color-value of the striations occupying the top of the portions of the second shingle sheet; and

5 providing the enhanced color-value gradation over each of the portions of the second shingle sheet which are exposed through the openings between the tabs by the combined visual appearance of the horizontal striations and the associated transition stripes such that an  
10 appearance of shingle depth is created by the resulting color-value gradations provided by the first and second shingle sheets.

27. The method of Claim 26 further comprising the step of providing different values of color on each of  
15 the respective tabs.

28. The method of Claim 26 further comprising the steps of: \_\_\_\_\_

20 forming the horizontal striations with color coated ceramic granules; and

forming the respective transition stripes from a mixture of approximately 50% of the color coated ceramic granules used to form the horizontal striation on one side of the respective transition stripe and  
25 approximately 50% of the ceramic coated mineral granules used to form the horizontal striation disposed on the opposite side of the respective transition stripe.

29. The method of Claim 26 further comprising the steps of:

5 forming each horizontal striation from ceramic coated mineral granules having a different value of color for each horizontal striation;

10 forming each transition stripe from a mixture of the ceramic coated mineral granules used to form the horizontal striations disposed on either side of the respective transition stripes; and

15 varying the ratio of the ceramic coated mineral granules used to form the respective transition stripe from 25% to 75% of the ceramic coated minerals used to form the horizontal striations disposed on either side of the respective transition stripe.

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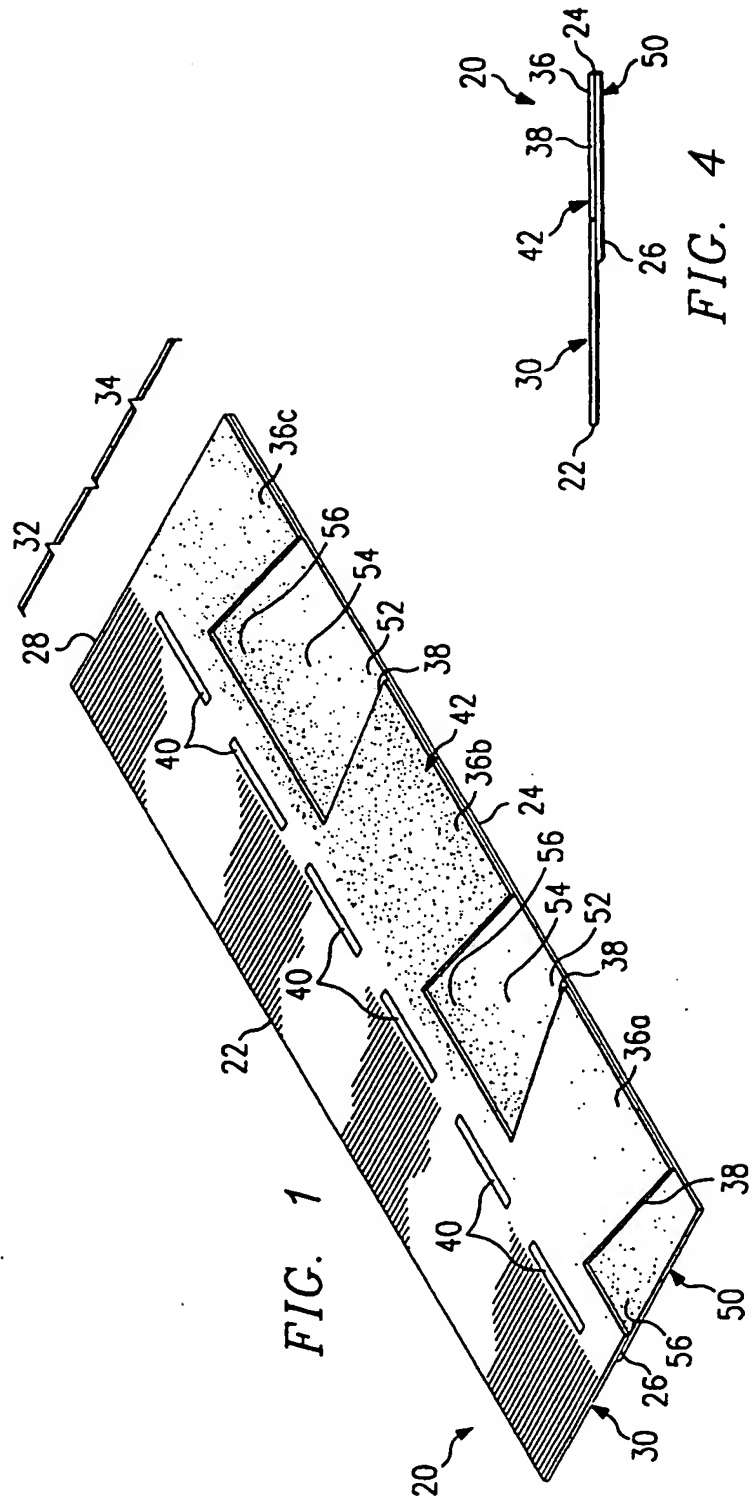
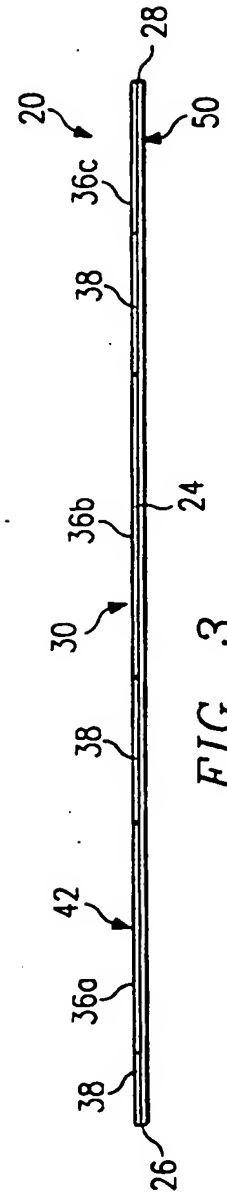
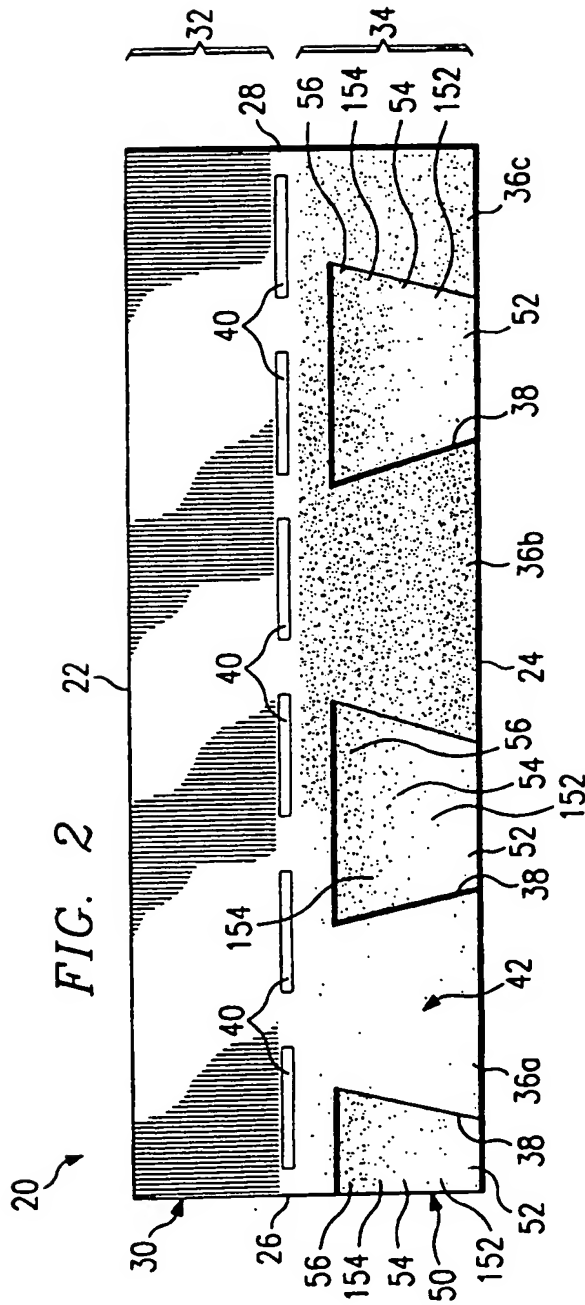


FIG. 1

FIG. 4





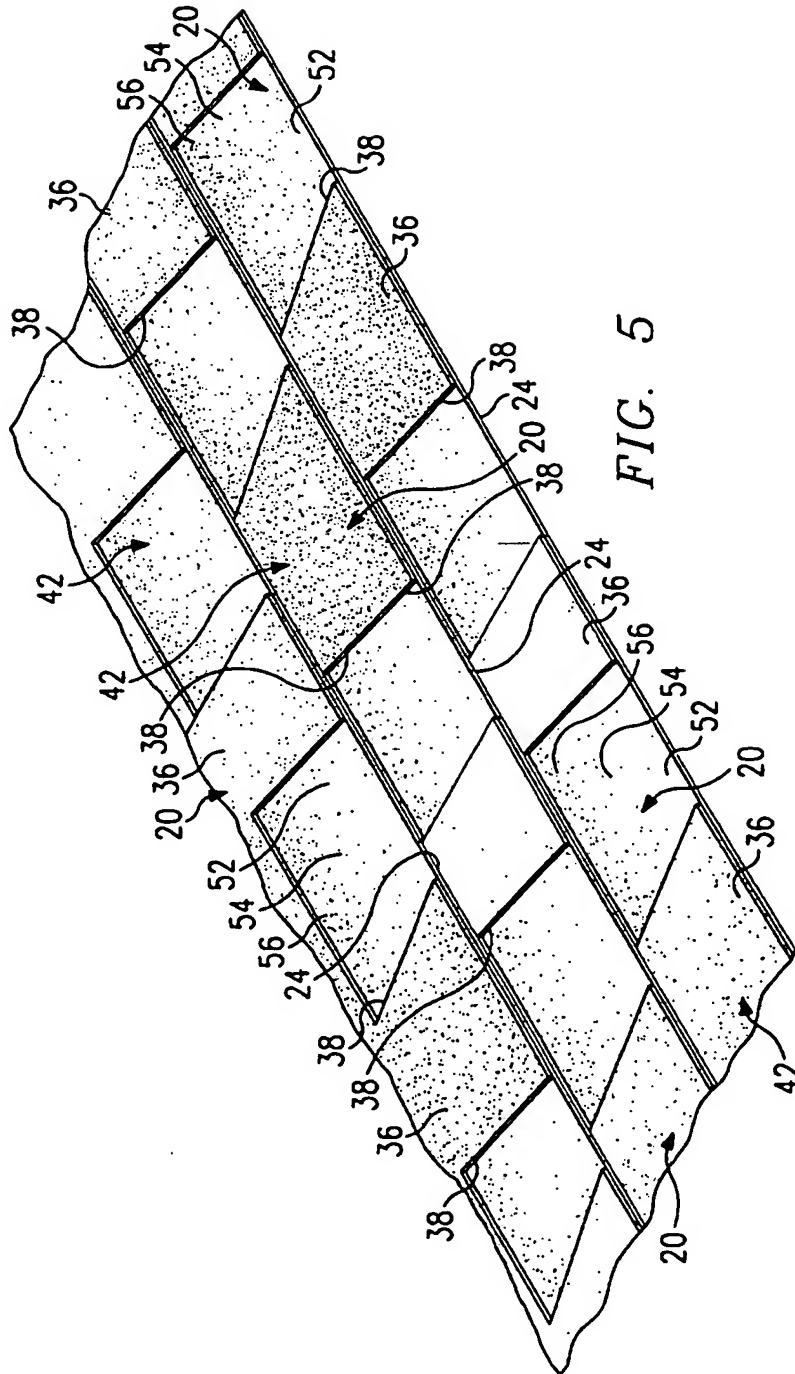
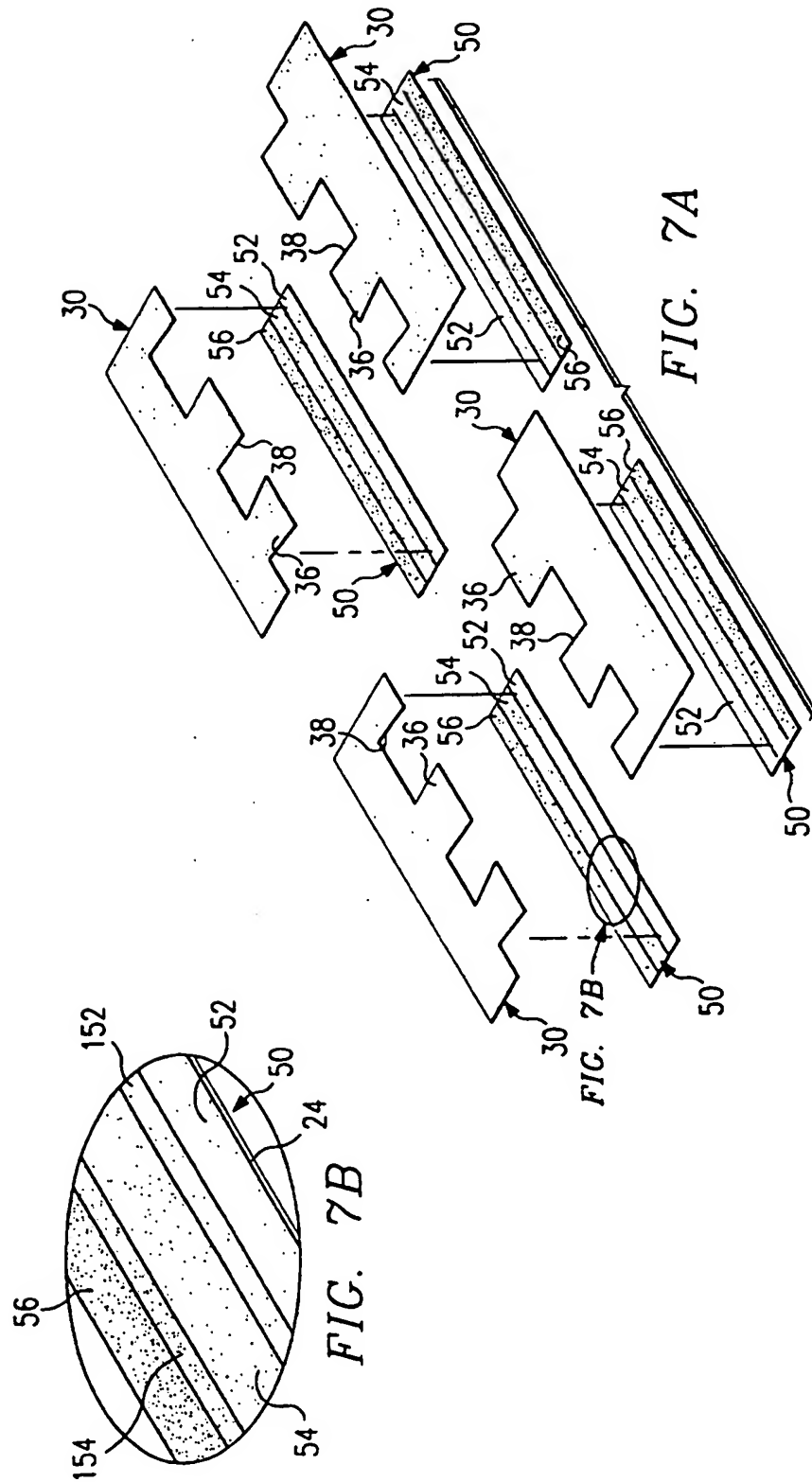


FIG. 5



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FIG. 8

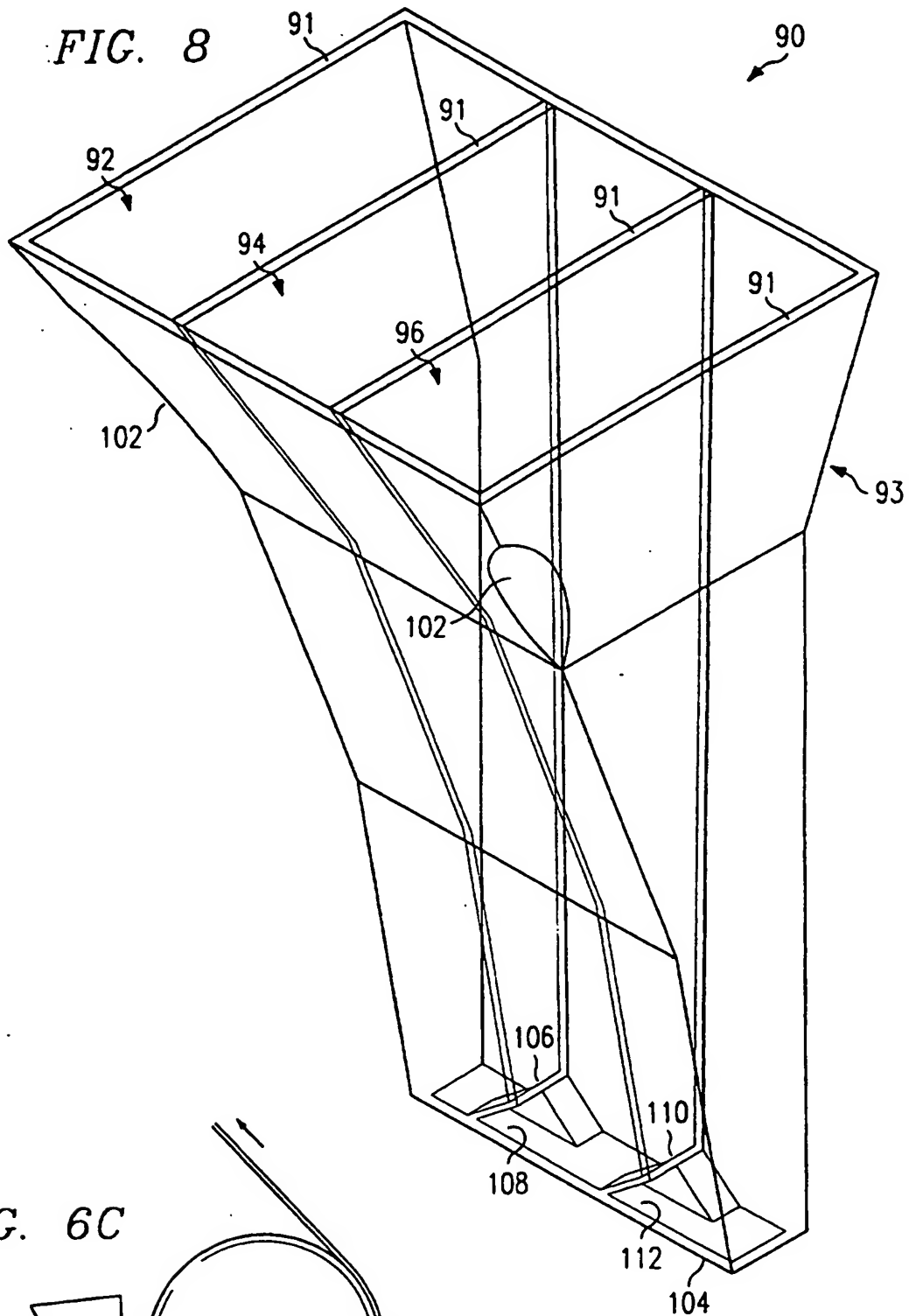
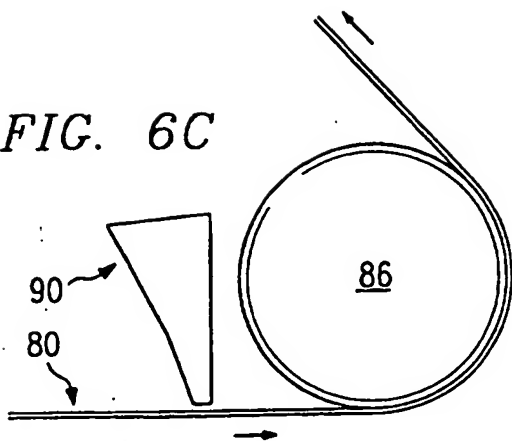


FIG. 6C



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US95/15657

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :E04D 1/28; B44F 7/00

US CL :52/557, 554, 518, 314

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 52/314, 315, 518, 554, 555, 557

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US, A, 5,369,929 (WEAVER ET AL) 06 December 1994, entire doc.	1-29
Y	US, A, 3,921,358 (BETTOLI) 25 November 1975, entire doc.	1-29
Y	US, A, 2,036,329 (GILES) 07 April 1936, entire doc.	1-29
A	US, S, 344,144 (WEAVER ET AL) 08 February 1994, entire doc.	1-29

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:	* T	later documents published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
* A* document defining the general state of the art which is not considered to be of particular relevance	* X*	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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* P* document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

04 MARCH 1996

Date of mailing of the international search report

19 MAR 1996

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